AMENDMENT OF SC	OLICITATION/MODIFIC	ATION OF CONTRACT		1. CONTRACT ID CODE	· PA	AGE OF PAGES	,
2. AMENDMENT/MODIFIC	CATION NO.	3. EFFECTIVE DATE	4. RE	QUISITION/PURCHASE REQ. NO.	5. PROJ	1 ECT NO. (If applie	cable)
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6. ISSUED BY	CODE	CPOD	7. Al	DMINISTERED BY (If other than Item 6)	CODE		
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	tal Protection	Agency	4				
	n Luther King I						
Mail Code: NW			1				
Cincinnati OH	45268						
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8. NAME AND ADDRESS	OF CONTRACTOR (No., stree	t, county, Stete and ZIP Code)	(x) ⁹	A. AMENDMENT OF SOLICITATION NO.			
BATTELLE MEMOR	TAT TMSTTTTTT		П				
505 KING AVE	TIME TWOITIOID		9	B. DATED (SEE ITEM 11)			
COLUMBUS OH 43	32012693		11	· · · · · ·			
			$ \mathbf{x} _{\mathbf{E}}^{1}$	OA. MODIFICATION OF CONTRACT/ORDER NO P-C-11-038).		
			1 1	0007			
			1	OB. DATED (SEE ITEM 13)			· · · · · · · · · · · · · · · · · · ·
CODE (b)(4)		FACILITY CODE	-	08/24/2012			
		44 THE ITEM AND VARBUES TO		· · · · · · · · · · · · · · · · · · ·			
		11. THIS ITEM ONLY APPLIES TO					
		inth in Item 14. The hour and date spe-		receipt of Offersis exten ition or as amended, by one of the following meth		is not extended.	
Items 8 and 15, and retu				eceipt of this amendment on each copy of the offe			
				AILURE OF YOUR ACKNOWLEGGEMENT TO			
				PECIFIED MAY RESULT IN REJECTION OF YO			
		r already submitted, such change may I prior to the opening hour and date sp		by telegram or letter, provided each telegram or	letter mal	kes reference	4 4
	PPRDPRIATION DATA (If reg		- Control				
See Schedule							
13. THIS	S ITEM ONLY APPLIES TO M	ODIFICATION OF CONTRACTS/ORDE	RS. IT I	MODIFIES THE CONTRACT/ORDER NO. AS DES	CRIBED	IN ITEM 14.	
		:					
CHECK ONE A THIS CH	HANGE ORDER IS ISSUED F	URSUANT TO: (Specify authority) Th	IE CHAN	GES SET FORTH IN ITEM 14 ARE MADE IN TH	E CONTI	RACT	
ORUER	NO. IN ITEM TUA.						
B. THE AB	OVE NUMBERED CONTRAC	T/ORDER IS MODIFIED TO REFLEC	T THE A	DMINISTRATIVE CHANGES (such as changes in Y OF FAR 43:103(b).	n paying o	office,	
appropri	nation date, etc.) SET FORTH	IN ITEM 14, PURSUANT TO THE AL	THORIT	Y OF FAR 43:103(b).			
C. THIS SU	UPPLEMENTAL AGREEMEN	TIS ENTERED INTO PURSUANT TO	AUTHO	RITY OF:			
						•	
D. OTHER	(Specify type of modification	and authority)			···		
X Mutual	l Agreement het	ween the Parties an	d Bar	ttelle's letter dated Jul	1 2 2 3	2013	
						, 2010	
E. IMPORTANT: Contra		is required to sign this document a		X			
	(b)(4)	Organized by UCF section headings,	incluaing	solicitation/contract subject matter where feasible	θ.)	*	
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· ·				Task Order Period of Pe			11
		ange the Task Order	Mana	iger/Alternate Task Order	Mana	ager.	
These are No C							
TOPO: Lukas Ou	idejans						
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Q							
Continued							
		document referenced in Item 9A or 1		eretofore changed, remains unchanged and in full			
15A. NAME AND TITLE OF	- SIGNER (Type or print)		16A.	NAME AND TITLE OF CONTRACTING OFFICE	ЕК (Туре	or print)	
			Cai	mille W. Davis			
15B. CONTRACTOR/OFFE	EROR	15C. DATE SIGNED		UNITED STATES OF AMERICA		16C. DATE S	SIGNED
		100, D. HE GIGIALD	100.	THE CITTLE OF CHILDREN		.50. 57.12.0	
/A/						08/09/	2013
(Signature of p	erson authorized to sign)			(Signature of Contracting Officer)			

NSN 7540-01-152-8070 Previous edition unusable STANDARD FORM 30 (REV. 10-83) Prescribed by GSA FAR (48 CFR) 53.243

PAGE REFERENCE NO. OF DOCUMENT BEING CONTINUED **CONTINUATION SHEET** EP-C-11-038/0007/001 2 2

NAME OF OFFEROR OR CONTRACTOR
BATTELLE MEMORIAL INSTITUTE

ITEM NO.	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE	AMOUNT (F)
	Period of Performance End Date changed				
	From: August 26, 2013			·	
	To: December 31, 2013				
	TOCOR (Task Order Contracting Officer's	7			* *
	Representative) changed		'		
	From: Emily Snyder				
	To: Lukas Oudejans				
	Alternate COR/Project Officer changed				
	From: Lukas Oudejans				
	To: Emily Snyder				
	Payment:	İ			
	RTP Finance Center				
	US Environmental Protection Agency RTP-Finance Center				
	Mail Drop D143-02				
	109 TW Alexander Drive				
	Durham NC 27711 Period of Performance: 08/24/2012 to 12/31/2013				
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AMENDMENT OF SOLICITATION/MODIFIC	ATION OF CONTRACT	1. CONTRACT ID CODE	PAGE OF PAGES
2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
002	See Block 16C		C.2.2.3.04
6. ISSUED BY CODE	CPOD	7. ADMINISTERED BY (If other than Item 6)	CODE
CPOD			L
US Environmental Protection	Agency		
26 West Martin Luther King I	~ 4		
Mail Code: NWD			
Cincinnati OH 45268		1	
8. NAME AND ADDRESS OF CONTRACTOR (No., stree	t, county, State and ZIP Code)	(x) 9A. AMENDMENT OF SOLICITATION NO.	
BATTELLE MEMORIAL INSTITUTE		•	
505 KING AVE		9B. DATED (SEE ITEM 11)	
COLUMBUS OH 432012693			
		x 100 MODIFICATION OF CONTRACT/ORDER N EP-C-11-038	0.
· · · · · · · · · · · · · · · · · · ·		0007	
		10B. DATED (SEE ITEM 13)	
CODE (b)(4)	FACILITY CODE	08/24/2012	
☐ The above numbered solicitation is amended as set for		O AMENDMENTS OF SOLICITATIONS ecified for receipt of Offers	nded. is not extended.
Items 8 and 15, and returning co separate letter or telegram which includes a reference THE PLACE DESIGNATED FOR THE RECEIPT OF virtue of this amendment you desire to change an offe	oies of the amendment; (b) By acknow to the solicitation and amendment nu OFFERS PRIOR TO THE HOUR AND to already submitted, such change ma	the solicitation or as amended, by one of the following meth wledging receipt of this amendment on each copy of the off umbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO D DATE SPECIFIED MAY RESULT IN REJECTION OF YO by be made by telegram or letter, provided each telegram or	er submitted; or (c) By BE RECEIVED AT DUR OFFER. If by
to the solicitation and this amendment, and is receive 12. ACCOUNTING AND APPROPRIATION DATA (If rec		pecified.	
See Schedule	juirea)		9
	ODIE:CATION OF CONTRACTS/OPE	DERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DE	SCRIBED IN ITEM 14
TO. THO TEN ONLY APPLIES TO W	ODII (ORTION OF CONTINUOTO) ONL	PERS. IT WOODINGS THE CONTRACTION DER NO. AS DE	JONIBED IN FIEM 14.
CHECK ONE A. THIS CHANGE ORDER IS ISSUED ORDER NO. IN ITEM 10A.	PURSUANT TO: (Specify authority) T	THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN T	HE CONTRACT
8. THE ABOVE NUMBERED CONTRA	CT/ORDER IS MODIFIED TO REFLE	CT THE ADMINISTRATIVE CHANGES (such as changes AUTHORITY OF FAR 43.103(b).	in paying office,
appropriation date, etc.) GETT ONTI	THATLEM 14, PORSOANT TO THE P	30 H 10 K 1 1 OF 1 AK 40, 100 (b).	1 -
C. THIS SUPPLEMENTAL AGREEMEN	T IS ENTERED INTO PURSUANT TO	O AUTHORITY OF:	
D. OTHER (Specify type of modification	and authority)		
X Mutual Agreement between	the Parties and Battell	le's proposal dated August 23, 2013	
E. IMPORTANT: Contractor X is not.	is required to sign this document	and return copies to the issuing	office.
14. DESCRIPTION OF AMENDMENT/MODIFICATION	(Organized by UCF section headings	s, including solicitation/contract subject matter where feasib	le.)
DUNS Number: (b)(4)			
The purpose of this modifica	tion is to incorpor	rate revisions to the Task Ord	der PWS as
		r these changes and the perfo	
remains te same.			
TOPO: Lukas Oudejans		· · · · · · · · · · · · · · · · · · ·	
LIST OF CHANGES:			
	114 (
Reason for Modification : Ad	ditional WorkPWS	revisions.	
The PWS revisions are No Cos	t changes. Task O	rder Period of Performance re	nains the same.
Continued			
	e document referenced in Item 9A or	10A, as heretofore changed, remains unchanged and in fu	
15A NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICE	ER (Type or print)
		Camille W. Davis	
158. CONTRACTOR/OFFEROR	15C. DATE SIGNED		16C. DATE SIGNED
	Joo. Brite Gronett	103. OTHER OF AMERICA	SO. DATE GIONED
(Signature of person authorized to sign)		(Signature of Contracting Officer)	09/03/2013
(Digital and of paraon authorized to sight)		(Signature of Contracting Citical)	

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REFERENCE NO. OF DOCUMENT BEING CONTINUED EP-C-11-038/0007/002

PAGE 2 OF 8

NAME OF OFFEROR OR CONTRACTOR

BATTELLE MEMORIAL INSTITUTE

ITEM NO.	SUPPLIES/SERVICES	QUANTITY		UNIT PRICE	AMOUNT
(A)	(B)	(C)	(D)	(E)	(F)
	Payment:	-			
	RTP Finance Center				
	US Environmental Protection Agency				,
	RTP-Finance Center				
	Mail Drop D143-02				
	109 TW Alexander Drive Durham NC 27711				
1	Period of Performance: 08/24/2012 to 12/31/2013			4 W	
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AMENDMENT OF SOLICITATION/MODIFIC	CATION OF CONTRACT	1. CONTRACT ID CODE	PAGE OF PAGES
2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
003	See Block 16C		C.2.2.3.04
6. ISSUED BY CODE		7. ADMINISTERED BY (If other than Item 6)	CODE
CDOD	0100		
CPOD US Environmental Protection	Agency	,	
26 West Martin Luther King			
Mail Code: NWD			
Cincinnati OH 45268			
8. NAME AND ADDRESS OF CONTRACTOR (No., stre	et, county, State and ZIP Code)	(x) 9A. AMENDMENT OF SOLICITATION NO.	
BATTELLE MEMORIAL INSTITUTE			
505 KING AVE		9B. DATED (SEE ITEM 11)	· · · · · · · · · · · · · · · · · · ·
COLUMBUS OH 432012693			
0011011000 011 102012090			
. *		x 10A. MODIFICATION OF CONTRACT/ORDI	ER NO.
		0007	
		10B. DATED (SEE ITEM 13)	
CODE (b)(4)	FACILITY CODE	08/24/2012	
		TO AMENDMENTS OF SOLICITATIONS	
The above numbered solicitation is amended as set		респва for receipt of Offers the solicitation or as amended, by one of the following	extended,is not extended.
		owledging receipt of this amendment on each copy of the	
		•	
		numbers. FAILURE OF YOUR ACKNOWLEDGEMENT	
		ND DATE SPECIFIED MAY RESULT IN REJECTION C lay be made by telegram or letter, provided each telegr	
to the solicitation and this amendment, and is receive			
12. ACCOUNTING AND APPROPRIATION DATA (If re	equired)		
See Schedule			
13. THIS ITEM ONLY APPLIES TO I	MODIFICATION OF CONTRACTS/OF	DERS. IT MODIFIES THE CONTRACT/ORDER NO. A	S DESCRIBED IN ITEM 14.
		· · · · · · · · · · · · · · · · · · ·	
CHECK ONE A. THIS CHANGE ORDER IS ISSUED	PURSUANT TO: (Specify authority)	THE CHANGES SET FORTH IN ITEM 14 ARE MADE	IN THE CONTRACT
ORDER NO. IN ITEM 10A.	<u> </u>	k ,	
B. THE ABOVE NUMBERED CONTRA	ACT/ORDER IS MODIFIED TO REFL	ECT THE ADMINISTRATIVE CHANGES (such as char AUTHORITY OF FAR 43.103(b).	nges in paying office,
appropriation date, etc.) SET FORT	H IN ITEM 14, PURSUANT TO THE	AUTHORITY OF FAR 43.103(b).	
C. THIS SUPPLEMENTAL AGREEME	NT IS ENTERED INTO PURSUANT	TO AUTHORITY OF:	
D. OTHER (Specify type of modification	n and authority)		·
		le's letter dated October 16, 201	3
E. IMPORTANT: Contractor 🗵 is not.	Is required to sign this documer		
14. DESCRIPTION OF AMENDMENT/MODIFICATION	I (Organized by UCF section heading	s, including solicitation/contract subject matter where t	easible.)
DUNS Number: (b)(4)			
The purpose of this modifica	ation is to extend	the Task Order period of pe	rformance through
January 31, 2014. This is a	a No Cost extension	i.	
TOPO: Lukas Oudejans			
LIST OF CHANGES:			
Reason for Modification: No	Cost Evtension		
Reason for modification. No	CODE DVCGHOTOH		
D			
Period Of Performance End Da	ite changed	2.4	
From: December 31, 2014			
To: January 31, 2014			
		er e getaal gebeur	
Continued			
Except as provided herein, all terms and conditions of t	the document referenced in Item 9A c	or 10A, as heretofore changed, remains unchanged and	in full force and effect.
15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING O	
		Camille W. Davis	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNE	D 16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
			11/00/0010
(Signature of person authorized to sign)		(Signature of Contracting Officer)	11/22/2013

	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE O	F
CONTINUATION SHEET	EP-C-11-038/0007/003	2	2

NAME OF OFFEROR OR CONTRACTOR

BATTELLE MEMORIAL INSTITUTE

Delivery Location Code: GRD NMSRC DCMD US Environmental Protection Agency 433 Old Eage Road Room #: E311G Outhan Nc 2773 USA Fayment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center (D143-02) 109 WR Agendor Drive Dunhan Nc 27711 FOB: Bestimation Foriod of Ferformance: OS/24/2012 to 01/31/2014	ITEM NO.	SUPPLIES/SERVICES	QUANTITY		UNIT PRICE	AMOUNT
US EPA 4930 Old Page Road Room #: E3110 Durham NC 27703 USA Payment: RTF Finance Center US Environmental Protection Agency RTP-Finance Center (D143-02) 109 TW Alexander Drive Durham NC 27711 FOB: Destination Period of Performance: 08/24/2012 to 01/31/2014	(A)	(B)	(C)	(D)	(E)	(F)
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Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center (D143-02) 109 TW Alexander Drive Durham Nc 27711 FOB: Destination Period of Performance: 08/24/2012 to 01/31/2014		Room #: E311G				
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BATTELLE MEMORIAL INSTITUTE 505 KING AVE SOLUMBUS OH 432012693 Table Ta	8. NAME AND	ADDRESS OF CONTRACTO	OR (No., street	t, county, State and	d ZIP Code)	(x) 9A	AMENDME	ENT OF SOLICIT	ATION NO.			
EF-C-11-038	505 KIN	G AVE	ITUTE			9B			TRACTION DEN	NO		
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SACINTY CODE (b)(4)	· ·					سنسا ا						
The above numbered solicitation is amended as a forth in Item 14. The hour and date specified for receipt of Offers The above numbered solicitation is amended as a forth in Item 14. The hour and date specified in the solicitation or as amended as an offer and acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (i) By considering and the internation of the hour and date specified in the solicitation or as amended by one of the following methods: (ii) By considering and the internation of the hour and the present electric or one of the same internation of the property of the same internation of the property of the property of the same internation of the property of the same internation of the property of the property of the same internation of the property of the property of the same internation and the property of the property of the same internation of the property of the same internation of the property of the same internation of the property of the same internation of the property of the same internation of the property of the same internation of the same internation of the property of the same internation of the same internation of the property of the same internation of the same intern						10	B. DATED (SEE ITEM 13)				
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NAME OF OFFEROR OR CONTRACTOR

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ORDER FOR SUPPLIES OR SERVICES SCHEDULE - CONTINUATION

PAGE NO

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IMPORTANT: Mark all packages and papers with contract and/or order numbers.

DATE OF ORDER CONTRACT NO.

08/24/2012 EP-C-11-038

ORDER NO. 0007

ITEM NO.	SUPPLIES/SERVICES	QUANTITY ORDERED			NIT RICE	AMOUNT	QUANTITY ACCEPTED
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PERFORMANCE WORK STATEMENT SYSTEMATIC DECONTAMINATION OF LEWISITE — NEUTRALIZATION AND ARSENIC REMOVAL

OMIS C.2.2.3.04

TABLE OF CONTENTS

I,	TITLE	2
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XIII.	REPORTING REQUIREMENTS	(

Field Code Changed

PERFORMANCE WORK STATEMENT STREAMS II Task Order 0007, Battelle EP-C-11-038

Task Order Manager (TOM)

Alternate Task Order Manager (ATOM)

Name: Emily Snyder Name: Lukas Oudejans

Office: ORD/NHSRC/DCMD Office: ORD/NHSRC/DCMD

10 TW Alexander Dr, MD E343-06 Durham, NC 27711 10 TW Alexander Dr, MD E343-06 Durham, NC 27711

Durham, NC 27711 Phone: (919) 541-2973 Fax: (919) 541-0496

Email: Snyder, Emily@epa.gov Email: Oudejans, Lukas@epa.gov

I. TITLE Systematic Decontamination of Lewisite - Neutralization and Arsenic Removal

II. PERIOD OF PERFORMANCE: August 24, 2012 through August 26, 2013

I. SUMMARY OF OBJECTIVES

This work shall provide the efficacies of various developmental and commercially available methods for chemical agent decontamination. Currently there are few known decontaminants for neutralization of Lewisite (conversion to a non-vesicant compound). Current literature states that bleach is effective but only solution-based data is referenced. The efficacy of bleach and other surface decontaminants against Lewisite deposited onto surfaces typically found in civilian facilities is unknown. This task order shall cover the evaluation of liquid, gel or foam based decontaminants for decontamination of Lewisite on interior building materials and evaluation of two methods for removal of arsenic after neutralization of the Lewisite.

II. RELEVANCE

Phone: (919) 541-1006

(919) 541-0496

The imminent threat of a chemical agent release in a building or transportation hub is driving the US EPA's National Homeland Security Research Center (NHSRC) Decontamination and Consequence Management Division (DCMD) to develop a research program that systematically evaluates potential decontaminants of chemical agents. The US EPA may be tasked to cleanup these agents after they are released and it is unknown how effective many of these available technologies are against chemical agents. In this work, the efficacy of a set of decontamination technologies and one arsenic removal technology shall be systematically evaluated and the effect of these decontaminants on the building material shall also be accessed qualitatively.

III. BACKGROUND

Protecting human health and the environment from the release of hazardous materials is the mission of the US EPA. During recent construction of the National Response Team (NRT) Quick Reference Guides, NHSRC scientists discovered there is a lack of data on the persistence of Lewisite and on decontamination of Lewisite contaminated surfaces. Current literature states

that Lewisite is relatively non-persistent, but no systematic work has been completed on its persistence on surfaces. All decontaminants must be able to neutralize the three different compounds that comprise Lewisite: L-1 (2-chlorovinyldichloroarsine, Lewisite); L-2 (di-(2-chlorovinyl)-chloroarsine); and L-3 (tris-(2-chlorovinyl)-arsine). In addition to converting the Lewisite to non-vesicant compounds, all decontamination operations must also consider how to remove the remaining arsenic.

IV. SCOPE

The overall objective of this work is to evaluate three (3) surface decontaminants for neutralization of Lewisite on three (3) different surfaces. For a subset of these coupons, the ability of one arsenic removal technology shall be tested. Prior to performing decontamination and removal experiments, method development regarding analysis of Lewisite and extraction of Lewisite and arsenic from the surfaces shall be required.

V. TECHNICAL APPROACH

The contractor shall perform a series of solution-based decontamination tests and surface-based decontamination tests. One removal technology for the remaining arsenic of the decontaminated coupons shall be assessed. Prior to these tests, method development shall be completed on the extraction and analysis of Lewisite and extraction of total arsenic. The Lewisite analysis of the extracts shall include analysis of all forms of Lewisite (L-1 (2-chlorovinyldichloroarsine, Lewisite), L-2 (di-(2-chlorovinyl)-chloroarsine), and L-3 (tris-(2-chlorovinyl)-arsine). The contractor shall also include the option to analyze the vesicant degradation/decontamination byproducts (2-chlorovinylarsenous acid and Lewisite oxide) in Tasks 1, 2, and 3 as a separate cost estimate. These tasks are discussed in more detail in the Section VIII.

TASKS - SYSTEMATIC DECONTAMINATION OF LEWISITE – NEUTRALIZATION AND ARSENIC REMOVAL

TASK 1: DRAFT A QUALITY ASSURANCE PLAN

The contractor shall draft a Quality Assurance (QAP) plan that shall cover the work outlined in this PWS including a project timeline. This QA plan shall follow guidelines set forth in Attachment #1 to the PWS. In this plan, the test matrices must include laboratory blanks, positive controls, and procedural blanks in addition to the test coupons. The test/QA plan shall be submitted to the EPA Task Order Manager (TOM) and approved by the EPA QA Manager prior to initiating the test matrix.

TASK 2: METHOD DEVELOPMENT FOR LEWISITE AND TOTAL ARSENIC

To develop the method for extraction and analysis of Lewisite, the contractor shall review publicly-available information and unclassified military methods for extraction and analysis of Lewisite from materials such as glass, wood, concrete, and metal. Analysis methods shall likely be liquid chromatography/mass spectrometry and gas chromatography/mass spectrometry. In addition, the analytes may require derivatization prior to analysis. During this literature search, the contractor shall also

identify methods for analysis of toxic by-products that may be formed when in contact with materials or as a result of decontamination.

From the outputs of the literature search, the contractor shall select up to three (3) solvents to test extraction efficiency. The analysis shall be determined from the literature search mentioned above. For each material, the extraction efficiency of these three solvents shall be evaluated in triplicate. Extraction efficiencies of 40%-120% with less than a 30% coefficient of variance between samples are deemed acceptable. This task shall generate up to 36 test coupon extracts, plus nine (9) positive controls and laboratory blanks.

Under this task method, detection limit studies for Lewisite on the three materials shall also be completed. These studies shall follow the single concentration design estimator recommended by the EPA (40 CFR part 136, Appendix B (1984)). When these studies are conducted, the agent shall not be diluted in solvent.

To determine a method for extraction of total arsenic from these same surfaces, the contractor shall consult with the EPA TOM to select two (2) extraction solvents for evaluation for extraction of arsenic from all three materials. For each material, the extraction efficiency of these two solvents shall be evaluated in triplicate. Extraction efficiencies of 40%-120% with less than a 30% coefficient of variance between samples are deemed acceptable. This task shall generate 18 test coupon extracts plus laboratory blanks. The contractor shall use ICP-MS (EPA Method 200.8) or graphite furnace atomic absorption (EPA Method 200.9) to determine total arsenic in the extracts.

TASK 3: PERFORM DECONTAMINATION EFFICACY TESTS

Prior to performing surface decontamination testing, a set of solution-based tests shall be conducted. Four (4) decontamination solutions representing a range of potential decontamination chemistries (acidic and alkaline hydrolysis, oxidation, etc.) shall be tested against Lewisite in solution for one (1) reaction time (TBD upon consultation with EPA TOM). This test matrix shall be conducted in triplicate with three (3) positive controls yielding a total of 12 samples for analysis in addition to the laboratory blanks.

One of the most important variables in the surface decontamination testing is the building material properties. The contractor shall perform tests on the following porous and non-porous building material coupons: sealed concrete; wood flooring material; and galvanized metal ductwork. The size of the building material coupons shall be 3.5 by 1.5 cm and other characteristics (such as brand, lot number, ASTM No.) of the building material coupons shall be provided by the EPA TOM. The contractor shall procure and prepare the coupons. The Lewisite shall be applied as a liquid either as one droplet or a series of droplets. The exact procedure shall be determined in consult with the TOM.

A test matrix for the surface decontamination testing is shown in Table 1. At least five (5) replicates of the test coupons, three (3) replicates of the positive controls, and two (2) replicates of procedural blanks at each of the contact times shall be analyzed. Contact times shall be in the range of 30 min to 1-2 hours and shall be determined in consultation with the EPA TOM. Environmental conditions shall be monitored but not controlled; however, care should be taken to avoid excessive flow over the coupons during the decontamination testing. The persistence of the Lewisite is not well characterized. If initial points within the test matrix show that there is no Lewisite remaining on the positive control, the TOM may adjust the remaining test matrix but shall ensure that the new test matrix has the same number of samples. The test matrix below shall yield 320 samples plus laboratory blanks. The contractor shall allow for 10 extra test matrix points (100 samples) for adjustments that may be needed during the testing.

Table 1: Test Matrix for Lewisite Neutralization

Decontaminant	Material		Contact Time	
Decontaminant A	Sealed concrete	t ₁	t ₂	
	Wood flooring material	t_1	t ₂	
	Galvanized metal ductwork	t ₁	t ₂	
	Glass	t_1	t ₂	
Decontaminant B	Sealed concrete	\mathbf{t}_1	t ₂	
	Wood flooring material	tı	t ₂	
	Galvanized metal ductwork	tı	t ₂	
	Glass	tı	t ₂	
Decontaminant C	Sealed concrete	t_1	t ₂	
	Wood flooring material	t_1	t ₂	
	Galvanized metal ductwork	tı	t ₂	
	Glass	t_1	t ₂	
Decontaminant D	Sealed concrete	tı	t ₂	
	Wood flooring material	tı	t ₂	
	Galvanized metal ductwork	t_1	t ₂	
	Glass	t_1	t ₂	

The decontaminants shall be identified by the EPA TOM based upon the solution decontamination testing and may be combinations of decontamination solutions. These decontaminants could potentially be in liquid, gel or foam form. The EPA TOM shall provide the methods for application of the liquid, gel or foam. These methods shall be based upon previous EPA testing.

Method development for the neutralization of these decontaminants may be required. The contractor shall consult with the EPA TOM on the design of this method development. The EPA TOM shall suggest neutralization agents that were successful in previous EPA or other's decontamination studies. The contractor shall anticipate 84 test coupon extracts in addition to laboratory blanks for this development study.

Ideally if a mass spectrometry method is selected for analysis of the Lewisite (all three forms) the contractor shall do the extract analysis in scan mode so that toxic by-products could potentially be identified. The effect of the decontaminants on the materials shall also be examined through visual inspection during these surface decontamination tests.

TASK 4: EXAMINE TECHNOLOGIES FOR REMOVAL OF ARSENIC

As stated above, when the Lewisite reacts to form less toxic (non-vesicant) compounds, the resulting products contain arsenic, a toxic metal. The contractor shall consult with the TOM to determine two (2) suitable methods for arsenic removal. These methods shall then be tested on two (2) sets of coupons of each material that was previously decontaminated (one contact time). These subsets of coupons shall be selected by the EPA TOM. Method development shall likely be required for this task because, typically, these removal technologies are applied over a larger scale. This test shall also be conducted with five (5) replicates of the test coupons, three (3) replicates of the positive controls, and two (2) replicates of procedural blanks for four (4) materials generating 160 samples to be analyzed for total arsenic.

TASK 5: DRAFT FINAL REPORT

The contractor shall draft a final report within eight (8) weeks after completing Task 4. The EPA TOM shall coordinate the peer review and QA review of the draft report and submit comments to the contractor for their response and products revision. The contractor shall respond to the comments from the peer reviewers and the EPA Quality Assurance officer within three (3) weeks after receipt of the comments.

VI. DELIVERABLE SCHEDULE

- On a monthly basis for the duration of the project, the contractor shall submit, in electronic format, progress reports summarizing technical progress, problems encountered, monthly and cumulative financial expenditures, and cost and schedule variance.
- Bi-weekly conference calls shall be established between the EPA TOM and the
 contractor project officer. During these conference calls, the contractor shall
 report on progress made in the project and any technical issues encountered in
 implementation of the test plan.
- 3. Within 30 working days of the issuance of this Task Order, a Quality Assurance Project Plan (QAPP) shall be provided to the EPA, in both electronic format (Microsoft Word, and Adobe) and hard copy. The EPA TOM shall then coordinate EPA QA review of the QAPP. The contractor shall then address any comments resulting from these reviews within 30 days after receipt of the comments. The contractor shall then provide a final copy of the QAPP amendment both in electronic and hard copy for EPA Approval. Work covered in

Tasks 3 and 4 shall not begin until the QAPP amendment has been approved by the EPA Quality Assurance Manager. The QAPP amendment shall contain work plans detailing how the experiments shall be run and include a timetable for task completion. The contractor shall adhere to QA requirements as delineated in "Attachment #1" to this PWS.

- 4. Transfer of project data (including raw data) shall occur at the conclusion of each experiment within each task. The data sheets should also include the exact experimental conditions (e.g. temperature and relative humidity), operation conditions, raw peak areas from the mass spectra or spectroscopy (as applicable), the calibration data sets for the coupon extracts, and the measured agent concentrations on the all of the coupons (test coupons, procedural blanks, positive controls, and laboratory blanks). The subsequent experiments shall not begin until the EPA TOM has reviewed and approved the data from the current task. The TOM shall provide the approval or disapproval within one (1) business day.
- 5. A draft final technical report shall be submitted within eight (8) weeks after the completion of the testing in Tasks 1 through 4 for all liquids and removal methods; thus only one (1) draft report shall be submitted under this PWS.
- 6. A single, final technical report shall be submitted that incorporates revisions based on comments from the peer reviewers, quality assurance reviewer and the EPA TOM. The final report is due within 30 calendar days after receipt of the comments.
- 7. A document describing any deviations from the QA plan shall also be provided along with the final report.

Table 2. Deliverable Schedule in Summary

Task Number	Deliverable :	Due Date
1	Draft QAPP (in Microsoft	Within 30 days after
	Word and pdf form) for	award of task order.
	review by TOM and EPA	
	QA Manager.	
1	QAPP (in Microsoft	Within 30 days after
	Word and pdf form) with	receipt of TOM and QA
	TOM and QA comments	comments,
	incorporated and response	
	to QA comments in table	
	form.	
2, 3, 4	Project data and	Within 10 business days
,	experimental conditions.	after completion of task.
. 5	Draft technical report (in	Within eight (8) weeks
	Microsoft Word and pdf	after completion of Task
	form) that includes all	1 through 4.
	data generated in Tasks 2,	
•	3, and 4.	
5	Final technical report with	Within 30 days after
	TOM, QA, and peer	receipt of all comments.
	review comments	
	incorporated. The	
	response to peer and QA	
	comments should be	
	submitted in table format.	

VII. REPORTING REQUIREMENTS

- Data and reports generated as a result of this effort shall be shared with the EPA TOM for internal EPA use.
- 2. Laboratory data shall be transferred electronically to the EPA TOM after the conclusion of each trial or series of tests. Raw data shall be included (specifically all conditions operational and environmental conditions, the raw peak areas from the mass spectra, and calibration data sets for the GC-MS of the coupon extracts).
- 3. All products developed under this PWS (e.g., the above mentioned technical report) must conform to the requirements of EPA's Handbook for Preparing Office of Research and Development Reports (EPA/800/K-95/002). Substantive portions of this handbook can be found at www.epa.gov/nhsrc under the policy and guidance.

Field Code Changed

- 4. Prior to submission of the final data package, all of the data shall be given to the EPA TOM in electronic format (specifically Microsoft Excel spreadsheets). The data on these spreadsheets shall be straightforward and explanation of the results via comments shall be added if they are not straightforward.
- Copies of internal audit reports and responses shall be sent to the EPA TOM in a timely fashion. The TOM and EPA Quality Assurance Manager should be immediately notified of any critical findings.
- The contractor shall document all data analysis including statistical models and related assumptions.

ATTACHMENTS Attachment 1: NHSRC Quality Assurance Requirements Form Attachment 2: NHSRC QA Requirements Definitions List

SURVEILLANCE PLAN STREAMS II Task Order 0007, Battelle EP-C-11-038

TITLE: Systematic Decontamination of Lewisite - Neutralization and Arsenic Removal

Task Order Manager (TOM): Emily Snyder

Performance Objective (Task)	Performance Standard (PS)	Surveillance Plan (SP)	Contractor Incentive (CI)	<u>✓</u> or X
Task 1: Draft Quality Assurance Plan	Contractor drafts a quality assurance plan and revises as directed by TOM and EPA's quality assurance (QA) manager.	TOM and the EPA QA manager will review the quality assurance plan.	TOM will address compliance in PPE	х
Task 2: Method Development Lewisite and Total Arsenic	Contractor is able to show Extraction efficiencies 40%- 120% with less than a 30% coefficient of variance for Lewisite and total arsenic for all materials.	TOM will examine extraction efficiency data upon receipt.	TOM will address compliance in PPE	x
Task 3: Perform Decontamination Efficacy Tests	Contractor runs all tests outlined in the test matrix and measures all data quality indicators outlined in QAPP. Data is delivered to TOM (raw data, percent recoveries and data quality indicators) periodically as indicated in PWS.	TOM will document whether receipt of data delivery is complete and timely.	TOM will address compliance in PPE	x
Task 4: Examine Technologies for Removal of Arsenic	Contractor runs all tests outlined in the SOW and measures all data quality indicators outlined in QAPP. Data is delivered to TOM (raw data, percent recoveries and data quality indicators) periodically as indicated in PWS.	TOM will document whether receipt of data delivery is complete and timely.	TOM will address compliance in PPE	x
Task 5: Draft Final Report	Contractor completes a draft of the final report. Contractor addresses TOM, QA and peer review comments.	TOM will provide comments on final report and document that the contractor has addressed all the TOM, QA and peer review comments.	TOM will address compliance in PPE	х